

CLAIMS

What is claimed is:

1. A method for freeform fabrication of a solid three-dimensional
5 structure, comprising:
dispensing at least one layer of support material onto a first substrate, the
support material comprising at least one of water and a fusible, water-containing
substance;
solidifying the at least one layer of support material;
10 dispensing at least one layer of build material onto a second substrate,
the build material being other than water or a fusible, water-containing
substance; and
solidifying the at least one layer of build material.
- 15 2. The method of claim 1, wherein dispensing at least one layer of
support material onto a first substrate comprises dispensing at least one layer of
support material comprising at least one of water and a fusible, water-containing
substance selected from the group consisting of brine and fusible crystal
hydrates.
- 20 3. The method of claim 2, wherein dispensing at least one layer of
support material comprising at least one of water and a fusible, water-containing
substance comprises dispensing at least one layer of support material
comprising at least one of water, brine and a fusible crystal hydrate selected
25 from the group consisting of sodium sulfate decahydrate, sodium acetate
trihydrate, sodium aluminum sulfate dodecahydrate, sodium carbonate
decahydrate, sodium phosphate dodecahydrate, and potassium aluminum
sulfate dodecahydrate.

4. The method of claim 1, wherein dispensing at least one layer of support material onto a first substrate comprises dispensing at least one layer of support material onto at least one of a build platform, a removable material, a previously solidified layer of build material, and a previously solidified layer of support material.

5. The method of claim 1, wherein dispensing at least one layer of support material onto a first substrate comprises dispensing at least one layer of support material from an inkjet print-head.

6. The method of claim 1, wherein dispensing at least one layer of support material onto a first substrate comprises extruding at least one layer of support material from a fused deposition modeling head.

7. The method of claim 1, wherein dispensing at least one layer of build material onto a second substrate comprises dispensing at least one layer of build material selected from the group consisting of waxes, polymers, pre-polymers and combinations thereof.

8. The method of claim 1, wherein dispensing at least one layer of build material onto a second substrate comprises dispensing at least one layer of build material onto at least one of a build platform, a removable material, a previously solidified layer of build material, and a previously solidified layer of support material.

9. The method of claim 1, wherein dispensing at least one layer of build material onto a second substrate comprises dispensing at least one layer of build material from an inkjet print-head.

10. The method of claim 1, wherein dispensing at least one layer of build material onto a second substrate comprises extruding at least one layer of build material from a fused deposition modeling head.

11. The method of claim 1, wherein dispensing at least one layer of support material onto a first substrate and dispensing at least one layer of build material onto a second substrate comprises dispensing at least one layer of support material and at least one layer of build material onto the same substrate.

12. The method of claim 1, wherein solidifying the at least one layer of support material comprises solidifying the at least one layer of support material by chemical curing, thermal curing, or exposure to a source of ultraviolet radiation.

13. The method of claim 1, wherein solidifying the at least one layer of build material comprises solidifying the at least one layer of build material by chemical curing, thermal curing, or exposure to a source of ultraviolet radiation.

14. The method of claim 1, further comprising accruing a plurality of layers of the build material successively bound to one another to form the solid three-dimensional object.

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15. An intermediate structure in the freeform fabrication of a solid three-dimensional object, comprising:

at least one layer of a support material comprising at least one of water and a fusible, water-containing substance; and

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at least one layer of a build material other than water or a fusible, water-containing substance.

16. The intermediate structure of claim 15, wherein the fusible, water-containing substance is selected from the group consisting of brine and a fusible crystal hydrate.

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17. The intermediate structure of claim 16, wherein the fusible, water-containing substance is a fusible crystal hydrate selected from the group consisting of sodium sulfate decahydrate, sodium acetate trihydrate, sodium aluminum sulfate dodecahydrate, sodium carbonate decahydrate, sodium phosphate dodecahydrate, and potassium aluminum sulfate dodecahydrate.

18. The intermediate structure of claim 15, wherein the build material is selected from the group consisting of waxes, polymers, pre-polymers, and combinations thereof.

19. The intermediate structure of claim 15, wherein each of the support material and the build material are formulated to be dispensed from an inkjet print-head.

20. The intermediate structure of claim 19, wherein each of the support material and the build material are formulated to be extruded from a fused deposition modeling head.

21. A method for freeform fabrication of a solid three-dimensional object having at least one feature requiring the use of a build support, comprising:

- dispensing at least one layer of support material onto a first substrate, the support material comprising at least one of water and a fusible, water-containing substance;
- solidifying the at least one layer of support material to produce the build support;
- dispensing at least one layer of build material onto a second substrate, the build material being other than water or a fusible, water-containing substance;
- solidifying the at least one layer of build material; and
- removing the build support to produce the solid three-dimensional object.

22. The method of claim 21, wherein dispensing at least one layer of support material onto a first substrate and dispensing at least one layer of build material onto a second substrate comprises dispensing at least one layer of support material and at least one layer of build material onto the same
5 substrate.

23. The method of claim 21, wherein removing the build support to produce the solid three-dimensional object comprises removing the build support by washing with water at ambient temperature.
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24. The method of claim 21, wherein removing the build support to produce the solid three-dimensional object comprises removing the build support by causing the build support to undergo a phase change.
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